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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/645,903	08/25/2000	Li Li	3361.2US (97-663.2)	6825

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EXAMINER	
GUERRERO, MARIA F	
ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 09/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/645,903	LI, LI	
	Examiner	Art Unit	
	Maria Guerrero	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 August 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the Amendment and the Request for continued examination filed August 8, 2005.

Status of Claims

2. Claims 1-9 are canceled. Claims 10-31 are pending.

Continued Examination Under 37 CFR 1.114

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 8, 2005 has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 10 is rejected under 35 U.S.C. 102(b) as being anticipated by Engeler (US 3,577,045) (of record).

Engeler shows performing a nitric acid solution dip followed by a phosphoric solution dip (col. 8, lines 30-40). Engeler inherently teaches removing oxide polymer

and metal polymer from the contact opening in a dielectric layer on a semiconductor substrate because the contact has been cleaned (Fig. 1-6, col. 8, lines 1-40).

In addition, there is no requirement that a person of ordinary skill in the art would have recognized the inherent disclosure at the time of invention, but only that the subject matter is in fact inherent in the prior art reference. Schering Corp. v. Geneva Pharm. Inc., 339 F.3d 1373, 1377, 67 USPQ2d 1664, 1668 (Fed. Cir. 2003). Toro Co. v. Deere & Co., 355 F.3d 1313, 1320, 69 USPQ2d 1584, 1590 (Fed. Cir. 2004).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 10-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant admitted prior art in view of Suzuki (US 4,080,619) (of record).

Applicant admitted prior art teaches providing a semiconductor substrate (202) having a conductive pad or metal trace (204) (aluminum, aluminum alloys, titanium, titanium alloy, or molybdenum), forming a barrier layer (206), and forming a dielectric layer (208) (Fig. 11-14, page 3). Applicant admitted prior art describes forming a first via portion having substantially parallel sidewalls through anisotropic etching of the dielectric layer (pages 2-4). Applicant admitted prior art discloses forming an oxide polymer residue with the first via portion (pages 3-4). Applicant admitted prior art shows

forming a second via portion having substantially parallel sidewalls through the portion of the barrier layer by anisotropic etching (Fig. 12-14). Applicant admitted prior art describes forming a metal polymer residue within the first and second via portions and applying a phosphoric acid containing solution to remove the residues (Fig. 12-14, pages 2-4).

Applicant admitted prior art does not specifically show applying the nitric acid dip. However, Suzuki teaches discloses applying a nitric acid dip followed by a phosphoric dip as conventional in the art (col. 4, lines 50-60).

Regarding the specific concentration, time, and temperature claimed, one of ordinary skill in the art would have found it prima facie obvious at the time of the invention to select the concentration merely by following the teachings of the references because there is not evidence of criticality. In this regard, it is well settled that it is not inventive to determine (by mere routine experimentation) the optimum values of a result-effective variable. In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir, 2003)("The normal desire of scientist or artisans to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) ("Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art."); In re aller 220 F. 2d 454, 456, 105 USPQ 233, 235, (CCPA 1955)("Where the general conditions of a claim are discloses in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.")

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to include the use of the nitric acid solution on Applicant admitted prior art as taught by Suzuki in order to remove any remaining layer without damaging the structure.

5. Claims 10-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant admitted prior art in view of Yamada Osamu (JP 05-041485).

Applicant admitted prior art teaches providing a semiconductor substrate (202) having a conductive pad or metal trace (204) (aluminum, aluminum alloys, titanium, titanium alloy, or molybdenum), forming a barrier layer (206), and forming a dielectric layer (208) (Fig. 11-14, page 3). Applicant admitted prior art describes forming a first via portion having substantially parallel sidewalls through anisotropic etching of the dielectric layer (pages 2-4). Applicant admitted prior art discloses forming an oxide polymer residue with the first via portion (pages 3-4). Applicant admitted prior art shows forming a second via portion having substantially parallel sidewalls through the portion of the barrier layer by anisotropic etching (Fig. 12-14). Applicant admitted prior art describes forming a metal polymer residue within the first and second via portions and applying a phosphoric acid containing solution to remove the residues (Fig. 12-14, pages 2-4).

Applicant admitted prior art fails to show applying a nitric acid dip and using the fluoride-containing compound. However, Yamada Osamu discloses applying a nitric acid or phosphoric acid, employing HF buffer liquid (HF + ammonium fluoride), followed by a nitric acid dip (Abstract, Example, paragraph 0010-0013).

Regarding the specific concentration, time, and temperature claimed, one of ordinary skill in the art would have found it prima facie obvious at the time of the invention to select the concentration merely by following the teachings of the references because there is not evidence of criticality. In this regard, it is well settled that it is not inventive to determine (by mere routine experimentation) the optimum values of a result-effective variable. In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir, 2003)("The normal desire of scientist or artisans to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) ("Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art."); In re aller 220 F. 2d 454, 456, 105 USPQ 233, 235, (CCPA 1955)("Where the general conditions of a claim are discloses in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.")

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to include the fluorine containing solution and the nitric acid containing solution on Applicant admitted prior art as taught by Yamada Osamu in order to improve the reliability of the device (Yamada Osamu, Abstract).

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA

1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 10-20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-32 of U.S. Patent No. 6,576,547. Although the conflicting claims are not identical, they are not patentably distinct from each other because '547 recites the basic step of applying a nitric acid solution followed by a phosphoric acid solution to a contact opening. '547 reference also recites the concentration, time and temperature as claimed.

7. Claims 21-31 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-16 of U.S. Patent No. 6,828,228. Although the conflicting claims are not identical, they are not patentably distinct from each other because '228 reference recites the basic steps of forming a first via portion, applying phosphoric acid-containing solution; forming a second via portion, applying nitric acid-containing solution. '228 reference also recites the concentration, time and temperature as claimed.

Response to Arguments

4. Applicant's arguments with respect to claims 10-31 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Cynkar et al. (US 4,425,606), Hineman et al. (US 6,136,767) and Hineman et al. (US 6,384,001) teach several embodiments related to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 571-272-1837. The examiner can normally be reached on M-F (8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

September 9, 2005

Maria Guerrero
MARIA F. GUERRERO
PRIMARY EXAMINER